

WHAT IS CLAIMED IS:

1. A method for facilitating inverse multiplexing over asynchronous transfer mode, comprising:
 - receiving a stream of sequentially aligned ATM cells via an originating end point logical communication link;
 - associating a sequence identifier with each one of said ATM cells for creating sequence-identified ATM cells;
 - holding a first portion and a second portion of said sequence-identified ATM cells in a first transmitter queue and a second transmitter queue, respectively, wherein the first transmitter queue and the second transmitter queue are associated with a first one and a second one, respectively, of a plurality of IM communication links; and
 - sequentially forwarding said sequence-identified ATM cells from each said queue over said associated one of the plurality of IM communication links, wherein the first one of the plurality of IM communication links has a data transmission rate disparate in at least one data transmission direction with respect to a data transmission rate of the second one of the plurality of IM communication links.
2. The method of claim 1 wherein:
 - receiving the stream of sequentially aligned ATM cells includes receiving the stream of sequentially aligned ATM cells at a transmitter queue selector; and
 - the transmitter queue selector is capable of enabling the first portion and the second portion of said sequence-identified ATM cells to be added to the first transmitter queue and the second transmitter queue, respectively.

3. The method of claim 1 wherein associating the sequence identifier with each one of said ATM cells includes determining a sequence code for each one of said ATM cells and inserting the sequence code for each one of said ATM cells into an information payload portion of a corresponding one of said ATM cells.

4. The method of claim 1 wherein associating the sequence identifier with each one of said ATM cells includes determining a sequence code for each one of said ATM cells and inserting the sequence code for each one of said ATM cells into a header portion of a corresponding one of said ATM cells.

5. The method of claim 4 wherein associating the sequence identifier with each one of said ATM cells includes identifying at least one of unused addressing bits and unused address space within the header portion of the corresponding one of said ATM cells and redefining said at least one of unused addressing bits and unused address space to designate the sequence identifier.

6. The method of claim 4 wherein:
 associating the sequence identifier with each one of said ATM cells includes
 identifying when a particular sequence identifier results in a header portion bit value that corresponds to a reference bit value designating a reference function.

7. The method of claim 6, further comprising:
 preventing the particular sequence identifier from being associated with any one of said ATM cells.

8. The method of claim 1 wherein associating the sequence identifier with each one of said ATM cells includes determining the sequence identifier for each one of said

3 ATM cells in response to each one of said ATM cells arriving at a transmitter queue
4 selector.

1 9. The method of claim 1, further comprising:

2 specifying a cell capacity of the first transmitter queue and a cell capacity of the
3 second transmitter queue, wherein the cell capacity of the first transmitter
4 queue and the cell capacity of the second transmitter queue are based on a
5 reference data transmission rate of the first one of the plurality of IM
6 communication links and to a reference data transmission rate of the second
7 one of the plurality of IM communication links, respectively.

1 10. The method of claim 9 wherein:

2 the cell capacity of the first queue and the cell capacity of the second queue are
3 different; and
4 an approximately common time period is required for transmitting a number of
5 cells equal to the cell capacity of the first queue and a number of cells equal to
6 the cell capacity of the second queue across the first one of the plurality of IM
7 communication links and the second one of the plurality of IM communication
8 links, respectively.

1 11. The method of claim 10 wherein holding the first portion and the second portion of

2 said sequence-identified ATM cells in the first transmitter queue and the second
3 transmitter queue, respectively, includes directing a next one of the sequence-
4 identified ATM cells to a most empty one of the first transmitter queue and the second
5 transmitter queue.

1 12. The method of claim 11 wherein holding the first portion and the second portion of

2 said sequence-identified ATM cells in the first transmitter queue and the second
3 transmitter queue, respectively, includes directing a previous one of the sequence-
4 identified ATM cells to one of the first transmitter queue and the second transmitter

queue and directing the next one of the sequence-identified ATM cells to a next transmitter queue with respect to said one of the first transmitter queue and the second transmitter queue.

13. The method of claim 1 wherein forwarding said sequence-identified ATM cells in a distributed manner over a plurality IM communication links includes forwarding said sequence-identified cells over a plurality of IM-ADSL communication links.

14. The method of claim 13 wherein:

a first one of said IM-ADSL communication links is synchronized at a first upstream data transmission rate; and

a second one of said IM-ADSL communication links is synchronized at a second upstream data transmission rate different than the first upstream data transmission rate.

15. The method of claim 13 wherein:

a first one of said IM-ADSL communication links is synchronized at a first downstream data transmission rate; and

a second one of said IM-ADSL communication links is synchronized at a second downstream data transmission rate different than the first downstream data transmission rate.

16. The method of claim 13 wherein:

a first one of said IM-ADSL communication links is synchronized at a first downstream data transmission rate and at a first upstream data transmission rate; and

a second one of said IM-ADSL communication links is synchronized at a second downstream data transmission rate different than the first downstream data transmission rate and at a second upstream data transmission rate different than the first upstream data transmission rate.

1 17. The method of claim 1, further comprising:

2 receiving at least a portion of said sequence-identified ATM cells; and
3 forwarding an aligned stream of inversely multiplexed ATM cells from the
4 receiver across a destination endpoint logical communication link.

1 18. The method of claim 17 wherein receiving said sequence-identified ATM cells

2 includes holding at least a portion of said sequence-identified ATM cells in a receiver
3 queue.

1 19. The method of claim 18, further comprising:

2 determining a receiver queue position associated with each one of said sequence-
3 identified ATM cells in response to receiving each one of said sequence-
4 identified ATM cells.

1 20. The method of claim 18 wherein forwarding the aligned stream of inversely

2 multiplexed ATM cells includes sequentially retrieving said sequence-identified ATM
3 cells from the receiver queue.

1 21. The method of claim 19 wherein sequentially retrieving said sequence-identified ATM

2 cells includes identifying a next one of said sequence-identified ATM cells to forward.

1 22. The method of claim 21 wherein identifying the next one of the sequence-identified

2 ATM cells includes determining the sequence identifier associated with the next one
3 of the sequence-identified ATM cell.

1 23. The method of claim 19 wherein sequentially retrieving said sequence-identified ATM

2 cells includes:

3 delaying forwarding of a received one of said sequence-identified ATM cells
4 being held in the receiver queue in response to determining that the next one of

5 said sequence-identified ATM cells is missing from an expected position in
6 the receiver queue;
7 discontinuing attempts to retrieve the next one of said sequence-identified ATM
8 cells after a prescribed time period elapses while the next one of said
9 sequence-identified ATM cells remains missing from the expected positioning
10 the receiver queue; and
11 retrieving the next one of said sequence-identified ATM cells before the
12 prescribed time period elapses in response to determining that the next one of
13 said sequence-identified ATM cells is located in the expected position in the
14 receiver queue after having initially determined that the next one of said
15 sequence-identified ATM cells was missing from an expected position in the
16 receiver queue.

- 1 24. The method of claim 23 wherein forwarding the aligned stream of inversely
2 multiplexed ATM cells from the receiver includes:
3 forwarding the received one of said sequence-identified ATM cells after the
4 prescribed time period elapses in response to the next one of said sequence-
5 identified ATM cells remains missing from the expected positioning the
6 receiver queue after the prescribed time period elapses; and
7 forwarding the next one of said sequence-identified ATM cells in response to
8 retrieving the next one of said sequence-identified ATM cells before the
9 prescribed time period elapses and after having initially determined that the
10 next one of said sequence-identified ATM cells was missing from an expected
11 position in the receiver queue.

1 25. A method for facilitating inverse multiplexing over asynchronous transfer mode,
2 comprising:
3 receiving a stream of sequentially aligned ATM cells via an originating end point
4 logical communication link, wherein the stream of sequentially aligned ATM
5 cells is received at a transmitter queue selector and the transmitter queue
6 selector is capable of enabling the first portion and the second portion of said
7 sequence-identified ATM cells to be added to the first transmitter queue and
8 the second transmitter queue, respectively;
9 associating a sequence identifier with each one of said ATM cells for creating
10 sequence-identified ATM cells, wherein associating the sequence identifier
11 with each one of said ATM cells includes identifying when a particular
12 sequence identifier results in a header portion bit value that corresponds to a
13 reference bit value designating a reference function and preventing the
14 particular sequence identifier from being associated with any one of said ATM
15 cells;
16 specifying a cell capacity of a first transmitter queue and a cell capacity of a
17 second transmitter queue, wherein the cell capacity of the first transmitter
18 queue and the cell capacity of the second transmitter queue are based on a
19 reference data transmission rate of the first one of the plurality of IM
20 communication links and to a reference data transmission rate of the second
21 one of the plurality of IM communication links, respectively;
22 holding a first portion and a second portion of said sequence-identified ATM cells
23 in the first transmitter queue and the second transmitter queue, respectively,
24 wherein the first transmitter queue and the second transmitter queue are
25 associated with a first one and a second one, respectively, of a plurality of IM
26 communication links;
27 sequentially forwarding said sequence-identified ATM cells from each said queue
28 over said associated one of the plurality of IM communication links, wherein
29 the first one of the plurality of IM communication links has a data transmission
30 rate disparate in at least one data transmission direction with respect to a data

31 transmission rate of the second one of the plurality of IM communication
 32 links;
 33 receiving at least a portion of said sequence-identified ATM cells by a receiver;
 34 determining a receiver queue position associated with each one of said sequence-
 35 identified ATM cells in response to receiving each one of said sequence-
 36 identified ATM cells; and
 37 forwarding an aligned stream of inversely multiplexed ATM cells from the
 38 receiver across a destination endpoint logical communication link.

1 26. The method of claim 25 wherein associating the sequence identifier with each one of
 2 said ATM cells includes determining a sequence code for each one of said ATM cells
 3 and inserting the sequence code for each one of said ATM cells into a header portion
 4 of a corresponding one of said ATM cells.

1 27. The method of claim 26 wherein associating the sequence identifier with each one of
 2 said ATM cells includes identifying at least one of unused addressing bits and unused
 3 address space within the header portion of the corresponding one of said ATM cells
 4 and redefining said at least one of unused addressing bits and unused address space to
 5 designate the sequence identifier.

1 28. The method of claim 25 wherein associating the sequence identifier with each one of
 2 said ATM cells includes determining the sequence identifier for each one of said
 3 ATM cells in response to each one of said ATM cells arriving at a transmitter queue
 4 selector.

1 29. The method of claim 25 wherein:
 2 the cell capacity of the first queue and the cell capacity of the second queue are
 3 different; and
 4 an approximately common time period is required for transmitting a number of
 5 cells equal to the cell capacity of the first queue and a number of cells equal to

the cell capacity of the second queue across the first one of the plurality of IM communication links and the second one of the plurality of IM communication links, respectively.

30. The method of claim 29 wherein holding the first portion and the second portion of said sequence-identified ATM cells in the first transmitter queue and the second transmitter queue, respectively, includes directing a next one of the sequence-identified ATM cells to a most empty one of the first transmitter queue and the second transmitter queue.

31. The method of claim 30 wherein holding the first portion and the second portion of said sequence-identified ATM cells in the first transmitter queue and the second transmitter queue, respectively, includes directing a previous one of the sequence-identified ATM cells to one of the first transmitter queue and the second transmitter queue and directing the next one of the sequence-identified ATM cells to a next transmitter queue with respect to said one of the first transmitter queue and the second transmitter queue.

32. The method of claim 25 wherein receiving said sequence-identified ATM cells includes holding at least a portion of said sequence-identified ATM cells in a receiver queue.

33. The method of claim 25 wherein forwarding the aligned stream of inversely multiplexed ATM cells includes sequentially retrieving said sequence-identified ATM cells from the receiver queue.

34. The method of claim 33 wherein sequentially retrieving said sequence-identified ATM cells includes identifying a next one of said sequence-identified ATM cells to forward.

35. The method of claim 34 wherein identifying the next one of the sequence-identified ATM cells includes determining the sequence identifier associated with the next one of the sequence-identified ATM cell.

1 36. The method of claim 33 wherein sequentially retrieving said sequence-identified ATM
2 cells includes:

3 delaying forwarding of a received one of said sequence-identified ATM cells
4 being held in the receiver queue in response to determining that the next one of
5 said sequence-identified ATM cells is missing from an expected position in
6 the receiver queue;

7 discontinuing attempts to retrieve the next one of said sequence-identified ATM
8 cells after a prescribed time period elapses while the next one of said
9 sequence-identified ATM cells remains missing from the expected positioning
10 the receiver queue; and

11 retrieving the next one of said sequence-identified ATM cells before the
12 prescribed time period elapses in response to determining that the next one of
13 said sequence-identified ATM cells is located in the expected position in the
14 receiver queue after having initially determined that the next one of said
15 sequence-identified ATM cells was missing from an expected position in the
16 receiver queue.

1 37. The method of claim 36 wherein forwarding the aligned stream of inversely
2 multiplexed ATM cells from the receiver includes:

3 forwarding the received one of said sequence-identified ATM cells after the
4 prescribed time period elapses in response to the next one of said sequence-
5 identified ATM cells remains missing from the expected positioning the
6 receiver queue after the prescribed time period elapses; and

7 forwarding the next one of said sequence-identified ATM cells in response to
8 retrieving the next one of said sequence-identified ATM cells before the
9 prescribed time period elapses and after having initially determined that the
10 next one of said sequence-identified ATM cells was missing from an expected
11 position in the receiver queue.

1 38. A data processor program product, comprising:

2 a first data processor program processable by a first data processor;

3 a first apparatus from which the first data processor program is accessible by the
4 first data processor; and

5 the first data processor program being capable of enabling the first data processor
6 to facilitate:

7 receiving a stream of sequentially aligned ATM cells via an originating
8 end point logical communication link;

9 associating a sequence identifier with each one of said ATM cells for
10 creating sequence-identified ATM cells;

11 holding a first portion and a second portion of said sequence-identified
12 ATM cells in a first transmitter queue and a second transmitter
13 queue, respectively, wherein the first transmitter queue and the
14 second transmitter queue are associated with a first one and a
15 second one, respectively, of a plurality of IM communication links;
16 and

17 sequentially forwarding said sequence-identified ATM cells from each said
18 queue over said associated one of the plurality of IM
19 communication links, wherein the first one of the plurality of IM
20 communication links has a data transmission rate disparate in at
21 least one data transmission direction with respect to a data
22 transmission rate of the second one of the plurality of IM
23 communication links.

1 39. The data processor program product of claim 38 wherein:

2 enabling the first data processor to facilitate receiving the stream of sequentially

3 aligned ATM cells includes enabling the first data processor to facilitate

4 receiving the stream of sequentially aligned ATM cells at a transmitter queue
5 selector; and

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the transmitter queue selector is capable of enabling the first portion and the second portion of said sequence-identified ATM cells to be added to the first transmitter queue and the second transmitter queue, respectively.

40. The data processor program product of claim 38 wherein enabling the first data processor to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first data processor to facilitate determining a sequence code for each one of said ATM cells and to facilitate inserting the sequence code for each one of said ATM cells into an information payload portion of a corresponding one of said ATM cells.

41. The data processor program product of claim 38 wherein enabling the first data processor to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first data processor to facilitate determining a sequence code for each one of said ATM cells and to facilitate inserting the sequence code for each one of said ATM cells into a header portion of a corresponding one of said ATM cells.

42. The data processor program product of claim 41 wherein enabling the first data processor to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first data processor to facilitate identifying at least one of unused addressing bits and unused address space within the header portion of the corresponding one of said ATM cells and to facilitate redefining said at least one of unused addressing bits and unused address space to designate the sequence identifier.

43. The data processor program product of claim 41 wherein enabling the first data processor to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first data processor to facilitate identifying when a particular sequence identifier results in a header portion bit value that corresponds to a reference bit value designating a reference function.

1 44. The data processor program product of claim 43 wherein the first data processor
2 program is further capable of enabling the first data processor to facilitate:
3 preventing the particular sequence identifier from being associated with any one of
4 said ATM cells.

1 45. The data processor program product of claim 38 wherein enabling the first data
2 processor to facilitate associating the sequence identifier with each one of said ATM
3 cells includes enabling the first data processor to facilitate determining the sequence
4 identifier for each one of said ATM cells in response to each one of said ATM cells
5 arriving at a transmitter queue selector.

1 46. The data processor program product of claim 38 wherein the first data processor
2 program is further capable of enabling the first data processor to facilitate:
3 specifying a cell capacity of the first transmitter queue and a cell capacity of the
4 second transmitter queue, wherein the cell capacity of the first transmitter
5 queue and the cell capacity of the second transmitter queue are based on a
6 reference data transmission rate of the first one of the plurality of IM
7 communication links and to a reference data transmission rate of the second
8 one of the plurality of IM communication links, respectively.

1 47. The data processor program product of claim 46 wherein:
2 the cell capacity of the first queue and the cell capacity of the second queue are
3 different; and
4 an approximately common time period is required for transmitting a number of
5 cells equal to the cell capacity of the first queue and a number of cells equal to
6 the cell capacity of the second queue across the first one of the plurality of IM
7 communication links and the second one of the plurality of IM communication
8 links, respectively.

1 48. The data processor program product of claim 47 wherein enabling the first data
2 processor to facilitate holding the first portion and the second portion of said
3 sequence-identified ATM cells in the first transmitter queue and the second
4 transmitter queue, respectively, includes enabling the first data processor to facilitate
5 directing a next one of the sequence-identified ATM cells to a most empty one of the
6 first transmitter queue and the second transmitter queue.

1 49. The data processor program product of claim 48 wherein enabling the first data
2 processor to facilitate holding the first portion and the second portion of said
3 sequence-identified ATM cells in the first transmitter queue and the second
4 transmitter queue, respectively, includes enabling the first data processor to facilitate
5 directing a previous one of the sequence-identified ATM cells to one of the first
6 transmitter queue and the second transmitter queue and directing the next one of the
7 sequence-identified ATM cells to a next transmitter queue with respect to said one of
8 the first transmitter queue and the second transmitter queue.

1 50. The data processor program product of claim 38 wherein enabling the first data
2 processor to facilitate forwarding said sequence-identified ATM cells in a distributed
3 manner over a plurality IM communication links includes enabling the first data
4 processor includes forwarding said sequence-identified cells over a plurality of IM-
5 ADSL communication links.

1 51. The data processor program product of claim 50 wherein:
2 a first one of said IM-ADSL communication links is synchronized at a first
3 upstream data transmission rate; and
4 a second one of said IM-ADSL communication links is synchronized at a second
5 upstream data transmission rate different than the first upstream data
6 transmission rate.

1 52. The data processor program product of claim 50 wherein:

a first one of said IM-ADSL communication links is synchronized at a first downstream data transmission rate; and
a second one of said IM-ADSL communication links is synchronized at a second downstream data transmission rate different than the first downstream data transmission rate.

53. The data processor program product of claim 50 wherein:

a first one of said IM-ADSL communication links is synchronized at a first downstream data transmission rate and at a first upstream data transmission rate; and
a second one of said IM-ADSL communication links is synchronized at a second downstream data transmission rate different than the first downstream data transmission rate and at a second upstream data transmission rate different than the first upstream data transmission rate.

54. The data processor program product of claim 38, further comprising:

a second data processor program processable by a second data processor;
a second apparatus from which the second data processor program is accessible by the second data processor; and
the second data processor program being capable of enabling the second data processor to facilitate:
receiving at least a portion of said sequence-identified ATM cells; and
forwarding an aligned stream of inversely multiplexed ATM cells from the receiver across a destination endpoint logical communication link.

55. The data processor program product of claim 54 wherein enabling the second data processor to facilitate receiving said sequence-identified ATM cells includes enabling the second data processor to facilitate holding at least a portion of said sequence-identified ATM cells in a receiver queue.

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1 56. The data processor program product of claim 55 wherein the second data processor
2 program is further capable of enabling the second data processor to facilitate:
3 determining a receiver queue position associated with each one of said sequence-
4 identified ATM cells in response to receiving each one of said sequence-
5 identified ATM cells.

1 57. The data processor program product of claim 55 wherein enabling the data processor
2 to facilitate forwarding the aligned stream of inversely multiplexed ATM cells
3 includes enabling the second data processor to facilitate sequentially retrieving said
4 sequence-identified ATM cells from the receiver queue.

1 58. The data processor program product of claim 57 wherein enabling the second data
2 processor to facilitate sequentially retrieving said sequence-identified ATM cells
3 includes enabling the second data processor to facilitate identifying a next one of said
4 sequence-identified ATM cells to forward.

1 59. The data processor program product of claim 58 wherein enabling the second data
2 processor to facilitate identifying the next one of the sequence-identified ATM cells
3 includes enabling the second data processor to facilitate determining the sequence
4 identifier associated with the next one of the sequence-identified ATM cell.

1 60. The data processor program product of claim 56 wherein enabling the second data
2 processor to facilitate sequentially retrieving said sequence-identified ATM cells
3 includes enabling the second data processor to facilitate:
4 delaying forwarding of a received one of said sequence-identified ATM cells
5 being held in the receiver queue in response to determining that the next one of
6 said sequence-identified ATM cells is missing from an expected position in
7 the receiver queue;
8 discontinuing attempts to retrieve the next one of said sequence-identified ATM
9 cells after a prescribed time period elapses while the next one of said

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sequence-identified ATM cells remains missing from the expected positioning the receiver queue; and
retrieving the next one of said sequence-identified ATM cells before the prescribed time period elapses in response to determining that the next one of said sequence-identified ATM cells is located in the expected position in the receiver queue after having initially determined that the next one of said sequence-identified ATM cells was missing from an expected position in the receiver queue.

61. The data processor program product of claim 60 wherein enabling the second data processor to facilitate forwarding the aligned stream of inversely multiplexed ATM cells from the receiver includes enabling the second data processor to facilitate:
forwarding the received one of said sequence-identified ATM cells after the prescribed time period elapses in response to the next one of said sequence-identified ATM cells remains missing from the expected positioning the receiver queue after the prescribed time period elapses; and
forwarding the next one of said sequence-identified ATM cells in response to retrieving the next one of said sequence-identified ATM cells before the prescribed time period elapses and after having initially determined that the next one of said sequence-identified ATM cells was missing from an expected position in the receiver queue.

1 62. A data processor program product, comprising:
2 a first data processor program processable by a first data processor;
3 a second data processor program processable by a second data processor
4 a first apparatus from which the first data processor program is accessible by the first
5 data processor;
6 a second apparatus from which the second data processor program is accessible by the
7 second data processor;
8 the first data processor program being capable of enabling the first data processor to
9 facilitate:
10 receiving a stream of sequentially aligned ATM cells via an originating
11 end point logical communication link, wherein the stream of
12 sequentially aligned ATM cells is received at a transmitter
13 queue selector and the transmitter queue selector is capable of
14 enabling the first portion and the second portion of said
15 sequence-identified ATM cells to be added to the first
16 transmitter queue and the second transmitter queue,
17 respectively;
18 associating a sequence identifier with each one of said ATM cells
19 for creating sequence-identified ATM cells, wherein associating
20 the sequence identifier with each one of said ATM cells
21 includes identifying when a particular sequence identifier
22 results in a header portion bit value that corresponds to a
23 reference bit value designating a reference function and
24 preventing the particular sequence identifier from being
25 associated with any one of said ATM cells;
26 specifying a cell capacity of a first transmitter queue and a cell
27 capacity of a second transmitter queue, wherein the cell
28 capacity of the first transmitter queue and the cell capacity of
29 the second transmitter queue are based on a reference data
30 transmission rate of the first one of the plurality of IM
31 communication links and to a reference data transmission rate

32 of the second one of the plurality of IM communication links,
33 respectively;
34 holding a first portion and a second portion of said sequence-
35 identified ATM cells in the first transmitter queue and the
36 second transmitter queue, respectively, wherein the first
37 transmitter queue and the second transmitter queue are
38 associated with a first one and a second one, respectively, of a
39 plurality of IM communication links; and
40 sequentially forwarding said sequence-identified ATM cells from
41 each said queue over said associated one of the plurality of IM
42 communication links, wherein the first one of the plurality of
43 IM communication links has a data transmission rate disparate
44 in at least one data transmission direction with respect to a data
45 transmission rate of the second one of the plurality of IM
46 communication links; and
47 the second data processor program being capable of enabling the second data
48 processor to facilitate:
49 receiving at least a portion of said sequence-identified ATM cells;
50 determining a receiver queue position associated with each one of
51 said sequence-identified ATM cells in response to receiving
52 each one of said sequence-identified ATM cells; and
53 forwarding an aligned stream of inversely multiplexed ATM cells
54 from the receiver across a destination endpoint logical
55 communication link.

1 63. An inverse multiplexing capable communication system, comprising:
2 a first communication apparatus including a first transmitter queue and a second
3 transmitter queue, wherein the first communication apparatus is capable of
4 being coupled between an originating endpoint logical communication link
5 and a plurality of IM communication links; and
6 a first data processor program processable by a first data processor of the first
7 communication apparatus;
8 the first data processor program being capable of enabling the first communication
9 apparatus to facilitate:
10 receiving a stream of sequentially aligned ATM cells via the originating
11 end point logical communication link;
12 associating a sequence identifier with each one of said ATM cells for
13 creating sequence-identified ATM cells;
14 holding a first portion and a second portion of said sequence-identified
15 ATM cells in the first transmitter queue and the second transmitter
16 queue, respectively, wherein the first transmitter queue and the
17 second transmitter queue are associated with a first one and a
18 second one, respectively, of the plurality of IM communication
19 links; and
20 sequentially forwarding said sequence-identified ATM cells from each said
21 queue over said associated one of the plurality of IM
22 communication links, wherein the first one of the plurality of IM
23 communication links has a data transmission rate disparate in at
24 least one data transmission direction with respect to a data
25 transmission rate of the second one of the plurality of IM
26 communication links.

1 64. The inverse multiplexing capable communication system of claim 64 wherein:
2 the first communication apparatus further includes a transmitter queue selector;

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3 enabling the first communication apparatus to facilitate receiving the stream of
4 sequentially aligned ATM cells includes enabling the first communication
5 apparatus to facilitate receiving the stream of sequentially aligned ATM cells
6 at the transmitter queue selector; and
7 the transmitter queue selector is capable of enabling the first portion and the
8 second portion of said sequence-identified ATM cells to be added to the first
9 transmitter queue and the second transmitter queue, respectively.

1 65. The inverse multiplexing capable communication system of claim 64 wherein
2 enabling the first communication apparatus to facilitate associating the sequence
3 identifier with each one of said ATM cells includes enabling the first communication
4 apparatus to facilitate determining a sequence code for each one of said ATM cells
5 and to facilitate inserting the sequence code for each one of said ATM cells into an
6 information payload portion of a corresponding one of said ATM cells.

1 66. The inverse multiplexing capable communication system of claim 64 wherein
2 enabling the first communication apparatus to facilitate associating the sequence
3 identifier with each one of said ATM cells includes enabling the first communication
4 apparatus to facilitate determining a sequence code for each one of said ATM cells
5 and to facilitate inserting the sequence code for each one of said ATM cells into a
6 header portion of a corresponding one of said ATM cells.

1 67. The inverse multiplexing capable communication system of claim 66 wherein
2 enabling the first communication apparatus to facilitate associating the sequence
3 identifier with each one of said ATM cells includes enabling the first communication
4 apparatus to facilitate identifying at least one of unused addressing bits and unused
5 address space within the header portion of the corresponding one of said ATM cells
6 and to facilitate redefining said at least one of unused addressing bits and unused
7 address space to designate the sequence identifier.

68. The inverse multiplexing capable communication system of claim 66 wherein enabling the first communication apparatus to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first communication apparatus to facilitate identifying when a particular sequence identifier results in a header portion bit value that corresponds to a reference bit value designating a reference function.

69. The inverse multiplexing capable communication system of claim 68 wherein the first data processor program is further capable of enabling the first communication apparatus to facilitate:
preventing the particular sequence identifier from being associated with any one of said ATM cells.

70. The inverse multiplexing capable communication system of claim 63 wherein:
the first communication apparatus further includes a transmitter selector; and
enabling the first communication apparatus to facilitate associating the sequence identifier with each one of said ATM cells includes enabling the first communication apparatus to facilitate determining the sequence identifier for each one of said ATM cells in response to each one of said ATM cells arriving at the transmitter queue selector.

71. The inverse multiplexing capable communication system of claim 63 wherein the first data processor program is further capable of enabling the first communication apparatus to facilitate:
specifying a cell capacity of the first transmitter queue and a cell capacity of the second transmitter queue, wherein the cell capacity of the first transmitter queue and the cell capacity of the second transmitter queue are based on a reference data transmission rate of the first one of the plurality of IM communication links and to a reference data transmission rate of the second one of the plurality of IM communication links, respectively.

1 72. The inverse multiplexing capable communication system of claim 71 wherein:
 2 the cell capacity of the first queue and the cell capacity of the second queue are
 3 different; and
 4 an approximately common time period is required for transmitting a number of
 5 cells equal to the cell capacity of the first queue and a number of cells equal to
 6 the cell capacity of the second queue across the first one of the plurality of IM
 7 communication links and the second one of the plurality of IM communication
 8 links, respectively.

1 73. The inverse multiplexing capable communication system of claim 72 wherein
 2 enabling the first communication apparatus to facilitate holding the first portion and
 3 the second portion of said sequence-identified ATM cells in the first transmitter queue
 4 and the second transmitter queue, respectively, includes enabling the first
 5 communication apparatus to facilitate directing a next one of the sequence-identified
 6 ATM cells to a most empty one of the first transmitter queue and the second
 7 transmitter queue.

1 74. The inverse multiplexing capable communication system of claim 73 wherein
 2 enabling the first communication apparatus to facilitate holding the first portion and
 3 the second portion of said sequence-identified ATM cells in the first transmitter queue
 4 and the second transmitter queue, respectively, includes enabling the first
 5 communication apparatus to facilitate directing a previous one of the sequence-
 6 identified ATM cells to one of the first transmitter queue and the second transmitter
 7 queue and directing the next one of the sequence-identified ATM cells to a next
 8 transmitter queue with respect to said one of the first transmitter queue and the second
 9 transmitter queue.

1 75. The inverse multiplexing capable communication system of claim 63, further
 2 comprising:

3 a second communication apparatus capable of being coupled between a destination
 4 endpoint logical communication link and the plurality of IM communication
 5 links; and
 6 a second data processor program processable by a second data processor of the second
 7 communication apparatus;
 8 the second data processor program being capable of enabling the second
 9 communication apparatus to facilitate:
 10 receiving at least a portion of said sequence-identified ATM cells; and
 11 forwarding an aligned stream of inversely multiplexed ATM cells from
 12 the second communication apparatus across the destination
 13 endpoint logical communication link.

1 76. The inverse multiplexing capable communication system of claim 75 wherein:
 2 the second communication apparatus further includes a receiver queue; and
 3 enabling the second communication apparatus to facilitate receiving said
 4 sequence-identified ATM cells includes enabling the second communication
 5 apparatus to facilitate holding at least a portion of said sequence-identified
 6 ATM cells in the receiver queue.

1 77. The inverse multiplexing capable communication system of claim 76 wherein the
 2 second communication apparatus program is further capable of enabling the second
 3 communication apparatus to facilitate:
 4 determining a receiver queue position associated with each one of said sequence-
 5 identified ATM cells in response to receiving each one of said sequence-
 6 identified ATM cells.

1 78. The inverse multiplexing capable communication system of claim 76 wherein
 2 enabling the data processor to facilitate forwarding the aligned stream of inversely
 3 multiplexed ATM cells includes enabling the second communication apparatus to
 4 facilitate sequentially retrieving said sequence-identified ATM cells from the receiver
 5 queue.

1 79. The inverse multiplexing capable communication system of claim 78 wherein
2 enabling the second communication apparatus to facilitate sequentially retrieving said
3 sequence-identified ATM cells includes enabling the second communication
4 apparatus to facilitate identifying a next one of said sequence-identified ATM cells to
5 forward.

1 80. The inverse multiplexing capable communication system of claim 78 wherein
2 enabling the second communication apparatus to facilitate identifying the next one of
3 the sequence-identified ATM cells includes enabling the second communication
4 apparatus to facilitate determining the sequence identifier associated with the next one
5 of the sequence-identified ATM cell.

1 81. The inverse multiplexing capable communication system of claim 77 wherein
2 enabling the second communication apparatus to facilitate sequentially retrieving said
3 sequence-identified ATM cells includes enabling the second communication
4 apparatus to facilitate:
5 delaying forwarding of a received one of said sequence-identified ATM cells
6 being held in the receiver queue in response to determining that the next one of
7 said sequence-identified ATM cells is missing from an expected position in
8 the receiver queue;
9 discontinuing attempts to retrieve the next one of said sequence-identified ATM
10 cells after a prescribed time period elapses while the next one of said
11 sequence-identified ATM cells remains missing from the expected positioning
12 the receiver queue; and
13 retrieving the next one of said sequence-identified ATM cells before the
14 prescribed time period elapses in response to determining that the next one of
15 said sequence-identified ATM cells is located in the expected position in the
16 receiver queue after having initially determined that the next one of said
17 sequence-identified ATM cells was missing from an expected position in the
18 receiver queue.

1 82. The inverse multiplexing capable communication system of claim 81 wherein
 2 enabling the second communication apparatus to facilitate forwarding the aligned
 3 stream of inversely multiplexed ATM cells from the receiver includes enabling the
 4 second communication apparatus to facilitate:
 5 forwarding the received one of said sequence-identified ATM cells after the
 6 prescribed time period elapses in response to the next one of said sequence-
 7 identified ATM cells remains missing from the expected positioning the
 8 receiver queue after the prescribed time period elapses; and
 9 forwarding the next one of said sequence-identified ATM cells in response to
 10 retrieving the next one of said sequence-identified ATM cells before the
 11 prescribed time period elapses and after having initially determined that the
 12 next one of said sequence-identified ATM cells was missing from an expected
 13 position in the receiver queue.

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1 83. An inverse multiplexing capable communication system, comprising:
2 a first communication apparatus including a first transmitter queue and a second
3 transmitter queue, wherein the first communication apparatus is capable of
4 being coupled between an originating endpoint logical communication link
5 and a plurality of IM communication links;
6 a second communication apparatus capable of being coupled between a destination
7 endpoint logical communication link and the plurality of IM communication
8 links;
9 a first data processor program processable by the first communication apparatus;
10 a second data processor program processable by the second communication apparatus;
11 the first data processor program being capable of enabling the first communication
12 apparatus to facilitate:
13 receiving a stream of sequentially aligned ATM cells via an originating
14 end point logical communication link, wherein the stream of
15 sequentially aligned ATM cells is received at a transmitter
16 queue selector and the transmitter queue selector is capable of
17 enabling the first portion and the second portion of said
18 sequence-identified ATM cells to be added to the first
19 transmitter queue and the second transmitter queue,
20 respectively;
21 associating a sequence identifier with each one of said ATM cells
22 for creating sequence-identified ATM cells, wherein associating
23 the sequence identifier with each one of said ATM cells
24 includes identifying when a particular sequence identifier
25 results in a header portion bit value that corresponds to a
26 reference bit value designating a reference function and
27 preventing the particular sequence identifier from being
28 associated with any one of said ATM cells;
29 specifying a cell capacity of a first transmitter queue and a cell
30 capacity of a second transmitter queue, wherein the cell
31 capacity of the first transmitter queue and the cell capacity of

the second transmitter queue are based on a reference data transmission rate of the first one of the plurality of IM communication links and to a reference data transmission rate of the second one of the plurality of IM communication links, respectively;

holding a first portion and a second portion of said sequence-identified ATM cells in the first transmitter queue and the second transmitter queue, respectively, wherein the first transmitter queue and the second transmitter queue are associated with a first one and a second one, respectively, of the plurality of IM communication links; and

sequentially forwarding said sequence-identified ATM cells from each said queue over said associated one of the plurality of IM communication links, wherein the first one of the plurality of IM communication links has a data transmission rate disparate in at least one data transmission direction with respect to a data transmission rate of the second one of the plurality of IM communication links; and

the second data processor program being capable of enabling the second communication apparatus to facilitate:

receiving at least a portion of said sequence-identified ATM cells; determining a receiver queue position associated with each one of said sequence-identified ATM cells in response to receiving each one of said sequence-identified ATM cells; and forwarding an aligned stream of inversely multiplexed ATM cells from the receiver across the destination endpoint logical communication link.